

What Is Claimed Is:

[Claim 1]

A discharge generation apparatus characterized in

5 that

one of electrodes is covered by an outer skin of an insulation body;

another of said electrodes is formed with a bare wire;

10 said electrodes is arranged closely along to an insulation core wire;

whereby ozone and barrier discharge are generated and NO is decomposed and in particular in an oxygen atmosphere for converting NO to NO<sub>2</sub> a waveform, high frequency voltage  
15 and a frequency number are changed to obtain a necessary amount.

[Claim 2]

20 A discharge generation apparatus according to claim 1, characterized in that

in said oxygen atmosphere the waveform, the high frequency voltage and the frequency number are changed suitably, and NO<sub>x</sub> such as NO and NO<sub>2</sub> is decomposed completely.

[Claim 3]

A discharge generation apparatus according to claim 1, characterized in that

NO is removed completely and by changing the high  
5 frequency voltage and the frequency number, said amount  
necessary of NO<sub>2</sub> for decomposing and reacting is generated  
and is controlled.

[Claim 4]

10 An exhaust gas processing apparatus using the  
discharge generation apparatus defined in claims 1-3,  
characterized in that

in a processing of a diesel exhaust gas including a  
particle substance, in a next process by combining a  
15 catalyst and in response to conditions of an exhaust gas,  
NO and NO<sub>2</sub> are removed and said amount and a component of a  
generation of NO<sub>2</sub> necessary for processing said particle  
substance are controlled;

thereby using said catalyst said particle substance  
20 is removed in a low temperature of about 300 C.

[Claim 5]

An exhaust gas processing apparatus according to  
claim 4, characterized in that

to said catalyst no use of a noble metal such as platinum and paradigm but using oxides of vanadium, molybdenum alumina and zeolite; and thereby a necessary function is attained.

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[Claim 6]

A particle substance processing apparatus, characterized in that

10 said particle substance is adsorbed by a permeation ceramic filter etc.;

said particle is divided to a single electrode pair or plural electrode pairs;

an adhesion condition is sensed by a resistance value of between said electrodes; and

15 said electrode necessary for processing is processed selectively;

thereby a performance improvement and a function maintenance are carried out.

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[Claim 7]

An exhaust gas processing apparatus, characterized in that

NOx decomposition and NOx generation are carried out at the same time using said insulation substance such as  
25 said ceramic of said insulation core wire defined in claim 1 and a particle substance oxidation catalyst such as

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vanadium and molybdenum oxide to said ceramic filter defined in claim 6, a reduction catalyst such as metal tin and indium which is burdened to alumina and gallium oxide.

5 [Claim 8]

An exhaust gas processing apparatus, characterized in that

by combing NOx processing apparatus using the barrier discharge defined in claims 1-3 and claim 6, not using  
10 completely the noble metal, the processing is carried out completely; and

in response to the component of the exhaust gas, a follow processing is carried out effectively.

15 [Claim 9]

An exhaust gas processing apparatus, characterized in that

to said apparatus, an ammonium high pressure reaction means or a plasma synthesis means is installed, using the  
20 nitrogen in air generated using the discharge etc. and hydrogen generated using an electric decomposition, a necessary amount of ammonium is generated; and

using said generated ammonium a decomposition of NOx is carried out safety and completely.

## [Claim 10]

An exhaust gas processing apparatus, characterized in that

a discharge wire is constituted with a net shape, a cylindrical shape and cloth shape; and said wire is constituted with alumina and glass in a part of an assemble wire;

a catalyst is burden to said wire and the discharge and a catalyst processing are carried out at the same time.

## [Claim 11]

A discharge element structure, characterized in that as an outer skin of an insulation of an insulation core wire, a heat resistance substance such as alumina is used; and

a discharge wire is constituted with a net shape, cylindrical shape and a cloth shape;

plural discharge wires are arranged not to contact electrically; and

among said discharge wires, a suitable electric voltage of direct current or alternating current is given;

thereby among said discharge wire, the current is flown when a conductive substance such as an electrolyte and a carbon group particle substance, and a burn-up and a drying are caused.

[Claim 12]

An exhaust gas decomposition apparatus according to claim 2, characterized in that

in the discharge generation apparatus in which NOx  
5 such as NO and NO<sub>2</sub> is decomposed and removed completely, in  
a system an oxygen supply is provided;

thereby an oxygen concentration is changed in  
response to an amount of decomposed NOx in the exhaust gas  
and NOx is decomposed and removed stably.

[Claim 13]

An exhaust gas decomposition apparatus according to claim 3, characterized in that

in the discharge generation apparatus in which NOx  
15 such as NO and NO<sub>2</sub> is decomposed and generated completely,  
in a system a hydrocarbon supply is provided;

thereby a hydrocarbon concentration is changed in  
response to an amount of decomposed NOx in the exhaust gas  
and a particle substance and NOx is decomposed and removed  
20 stably.

[Claim 14]

NOx decomposition apparatus according to claims 1-5,  
Claims 9-10 and claims 12-13, characterized in that

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when an amount of NO<sub>2</sub> and NO<sub>x</sub> is controlled by discharge energy according to an electric application voltage, NO<sub>x</sub> concentration and NO<sub>2</sub> concentration of before and after a processing are detected; and

5        a change condition of a normal, an increase and decrease state is grasped; thereby a discharge energy point is determined.

[Claim 15]

10        An exhaust gas processing system, characterized in that

in an exhaust gas processing means used for a moving machine such as a automobile using a discharge and an electric application , an additional electric power amount  
15        for necessary to said exhaust gas processing is added; and to form a compatibility to an already established generator, a generator is exchanged over.

[Claim 16]

20        A processing apparatus construction system, characterized in that

in an exhaust gas processing apparatus, a processing element is formed to module every each functions, and said processing element is constituted in series, in parallel,  
25        or a combination thereof;

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thereby a capacity adjustment and a durability performance are improved and at the same time a productivity performance, a reliability performance and a maintenance performance are improved remarkably.

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[Claim 17]

A discharge element, characterized in that  
in a discharge insulation wire, plural discharge wires are constituted, a length of said discharge wire is  
10 adjusted and a thickness of said wire is changed over;  
thereby a discharge characteristic is changed over  
freely and suitably.

[Claim 18]

15 An exhaust gas processing apparatus, characterized in  
that

in a means for decomposing a particle substance,  $\text{NO}_2$   
is generated according to the discharge and at the same  
time said particle substance is removed completely using a  
20 sulfuric oxide in fuel and sulfuric oxide which is burdened  
in advance without a catalyst and an additional adjustment  
of oxygen or hydrocarbon is performed as occasion demands.

[Claim 19]

25 An exhaust gas processing apparatus, characterized in  
that

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in an exhaust gas processing means, a decomposition, a generation and a removal of a harmful gas and a particle substance are carried out safely and surely and an energy saving is carried out;

5           to utilize effectively heat which is generated in  
said means, a heat insulation structure is employed.

[Claim 20]

An exhaust gas processing apparatus, characterized in  
10 that  
by combining an adjustment according to the discharge  
defined in claim 17 and an electric discharge energy  
adjustment and an organic adjustment are carried out;  
thereby a processing ability performance a processing  
15 reliability performance and a cost performance are improved  
remarkably.